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Elephant (*Elephas maximus*) in
Corbett National Park

Photo : Narendra Singh



Male Sika deer (*cervus nippon*)

Photo : Courtesy New Zealand
Forest Service

A LOUD THINKING

Sika deer (*Cervus nippon*) is the first cousin of sambar (*Cervus unicolor*) and Barasingha (*Cervus duvauceli branderi*). It is found in most parts of Europe and is very common in Scotland, where it has acquired menacing proportions as a pest to forest crops and agriculture.

Sika deer are primarily a woodland species. They quickly colonise new woodlands and adapt to changed environment. If frequently disturbed they become secretive and nocturnal.

Sika deer are a prolific breeder and quickly reach higher densities in favourable habitat. Most adults, about 75% of yearlings and upto 30% of calves are fertile. They successfully hybridise with red deer (*Cervus elephas*) and produce fertile offspring.

Though under the Wild and Country Side Act 1981 (Schedule 9) of Scotland it is illegal to release Sika deer in new areas in Scotland (owing to its nuisance value as a pest to forest crops and agriculture), nevertheless, on trial basis it can be introduced to India in areas having similar climatic conditions. Garhwal Himalayas and Meghalaya are two suitable areas for translocation of Sika deer. If this trial succeeds, who knows, this woodland pest of Scotland may prove boon for dwindling wildlife of India. It will feed on oaks of which there is no dearth in these areas. Sika deer is expected to interbreed with Sambar and later on it can migrate to foothills of Himalayas and terai and bhabhar region and become main prey animal of tiger and leopard.

References — Scottish Forestry. Vol-52 No. 3&4 - 1998 Under Monitor - A policy of Sika deer in Scotland; Deer Commission for Scotland. Page -189.

— I.S.Negi

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THE VANISHING RHINO OF INDIA

BY

LATE M.D.CHATURVEDI

Trigger-Happy hunters with their blinding flash lights, high-velocity weapons, ubiquitous jeeps and easy consciences have brought about the extinction of about 30 species of mammals during the last hundred years. The species that readily succumbed to this wanton assault were naturally those that lacked alacrity, finesse, and ability to fend for themselves. Among such helpless creatures, the Indian rhino* stands high on the list of those that are on their way out.

Born and bred in the land of Buddha and Gandhi, the Indian rhino is meek and mild and not half-so-wild as it looks. Unlike its ferocious and unpredictable African cousins, the Indian rhino loves to live and let live. As further evidence of its non-violent nature, it considers two horns a needless ostentation. It sports only one, more as a symbol of its might rather than a weapon for fight. Even at bay it seldom gores its enemy; it prefers to bite. The horn is much more in evidence in the training of a baby by its mother.

Pre-historic Prodigy

Its enormous size, the armour-plate studded with tubercles that it wears, and the single horn that adorns its nose strike awe and compel respect from other denizens of the forest. The elephant, the lord of the animal kingdom, gives it a wide berth; the tiger slinks away at its sight; and the panther hides its hide in mortal dread. No animal wants to measure its strength against that of this veritable monster which seems to have walked straight out of the dinosaurian days.

This pre-historic whale of an animal, reminiscent of the mastodons that stalked the earth in ancient times, once frequented the entire marshy tract skirting the Himalayas extending well over 1,500 miles.

Recent excavations which unearthed a pre-Aryan civilization

*The great Indian one-horned rhinoceros : *Rhinoceros unicornis*.

at Mohenjodaro and Harappa in the northwest of India around B.C. 2,500—1,500, revealed the place of pride the rhino enjoyed in that dim and distant past. The vast majority of seals of that period preserved at the National Museum in New Delhi depict the rhino as the insignia of their might. The lion had to wait for recognition as a royal emblem until Emperor Ashoka appeared on the scene, 264 B.C.

Babar, the founder of the Mughal Empire in India referred to the rhino in his hunting exploits in the Indus Valley around 1525. It was about the same time that the King of Cambay (north of Bombay) sought to impress King Emanuel I of Portugal by presenting him with one of his palace pets, a rhino which in captivity would eat out of your hand. The Royal household in Lisbon must have had a fit at the sight of this so-called pet.

Massive Monster

Looking like nothing on earth (except like other rhinos) this great one-horned creature is more like a patton tank of the animal kingdom careering about on its stumpy legs absent-mindedly in mud and slush. In this gigantic Goliath, weighing 1.5 to 2 metric tonnes*, one begins to suspect Nature indulging in a caricature of its other creatures, but not for long. One soon gets used to the impossible proportions of a 3.5 metres long body supported by short legs measuring no more than 75 cms. Its shoulder height is approximately 180 cms for male and 160 cms for female.

For an animal conceived on such pharaohick dimensions, it has tiny eyes stuck like beads on the side of its head half way between its erect ears and nostrils. Its unseeing eyes are largely responsible for unexpected encounters with this otherwise well intentioned beast. The mother with a calf, however, must never be treated lightly and should be given a wide berth.

The rhino has but one consuming passion in its life, and that is

*Male 2070; female 1,608 Kgms.—Basle Zoo.

to feed itself. While its black African counterpart lives on protein-rich leaf-fodder, the Indian rhino has to make do only with grass. What its intake lacks in quality has to be made up in quantity. It devotes most of its wakeful hours in devouring vast quantities of grass which it disposes off like a lawn-mover. It settles down to its gargantuan meal in the evening and feeds practically throughout the night. To escape fleas and flies it wallows in muddy holes during the heat of the day. It avoids running streams. At a pinch it swims like a whale with its horn on its nose held high and ears sticking out.

Dull-Witted Dodo

Having never faced any struggle for its existence, the rhino has had no need to develop any of its senses of perception. It hears little and sees less. It lacks finesse and is devoid of even a semblance of intelligence. All it needs is to smell its way to a good grazing ground where it encounters little competition from its associates of the deer tribe and domestic cattle. Unlike other animals, it seldom senses danger and is apt to tarry around even when it does. The rhino is a lone traveller. It loves its own company, and avoids intruders. It does not mind cattle and is often seen grazing along with buffaloes. It makes an exception, however, in the case of egrets which are often found riding on its back feasting on the ticks which the folds of its skin harbour. Unwittingly, these birds betray the whereabouts of their host, and act as veritable call-birds for poachers.

In its personal habits this wallower-in-the-mud has a peculiar instinct to go to the same place to drop its dung. The dung-heaps provide another clue of its proximity to the hunter.

Unwilling Breeder

The rhino is a reluctant breeder *pace* its proverbial horn. It takes a lot to coax the male to take notice of the advances of the female which take the form of a shrill whistle. In heat at regular intervals of about 45 days, the female pants and hisses and is generally

*Record 24". British Museum, London—E.P.Gee.

off feed. At Whipsnade, the administration of sex hormones to the male was successfully tried in overcoming its aversion to mating.

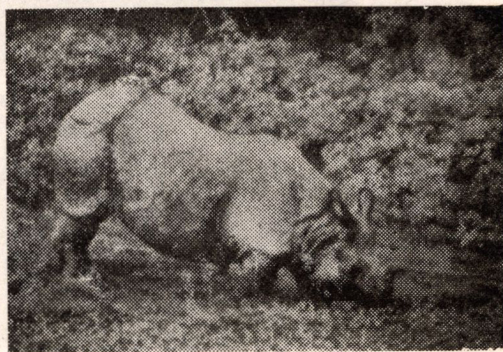
The gestation period is about 16 months, (Whipsnade, 488 days; Basle 476 days). A single hornless offspring is born which keeps to its mother's heels for close on 2 years. Babies at birth weigh around 65 kilograms and tape about 125 cms in length. Like horses, the mother seldom licks its offspring.

The rhino's span of life is believed to be about 50 years. In the London and Berlin Zoos the Indian rhinos lived for a period of 40 and 36 years respectively, not counting the age at which they were imported.

With no natural enemies, the rhino should have multiplied like the rabbit in Australia or the spotted deer in the Andamans. Instead, it is on its way out all over its haunts in Southeast Asia and Africa. The woolly European rhino became extinct during the glacial epoch. Two species of the rhino disappeared from India as late as during the nineteenth century. And our one-horned survivor no longer frequents its former haunts which once extended from the Indus to the Brahmaputra. It is now on its last legs biding its time in a tiny corner in the northeast. It would have disappeared like other members of its tribe, had special protection not been extended to it in the sanctuaries created for the purpose.

Hunter's Horn

Having no enemies to contend with in Nature, the rhino does the next best thing. And that is to grow its own enemy in the shape of the horn on its nose. Measuring between 12" to 15", the horn is worn by both sexes*. It is composed of solid ceratin of fibrous tissue suggesting modified hair. This solitary horn just sits on the nose, and if lost by accident grows again like one's nail. It is not connected with the bones of the skull as is the case with the horns of cattle and antlers of deer. The average weight of the horn of a mature rhino is around 1,200 grams (max. recorded 1,776 gms.).



Rhinoceros in Kaziranga National Park.



(A) Female rojh lying on road after hit by some vehicle near Manaklao.



(B) Providing water through water bottle to injured rojh.

The horn has been endowed with fantastic aphrodisiac properties throughout Southeast Asia and China. Auctions in Assam during 1962 and 1965 fetched about 80 U.S. cents per gram of the horn. Its retail price would be about the same as that of gold.

People who pay such fancy prices for its horn are blissfully ignorant of the fact that the rhino which wears it is by no means noted for its potency. At Whipsnade, a young rhino had to be given a dose of hormones before it mated. Its celebrated horn proved of little avail in the matter. Nor do the so-famed aphrodisiac properties of the rhino horn find any support in the meticulous analysis carried out by Swiss Chemists.

But superstitions die hard. The fame that the horn has enjoyed through the ages persists despite all efforts to enlighten its gullible dupes. Not only its horn, but also its bones, blood, flesh and even urine have been vested with mystical properties. In Nepal, children wear its teeth as a charm to ward off the evil eye. Dried blood is used in indigenous medicines and fetches about a U.S. dollar a pound. Rhino horn cups were used in royal households in the Orient for detecting poison in drink and for imparting potent powers to water drunk from it. It is not easy to dispel the spell cast by the rhino on the credulous masses.

The horn, however, constitutes the chief attraction. At the Raffles museum in Singapore a stuffed rhino was deprived not only of its original horn, but also of its papier mache substitutes twice. It is for this nugget of gold on its nose that the rhino has been hunted through the ages. The temptation that its horn offers to the jungle folks is irresistible. They devise draconian methods like snaring, pitting and netting the rhino. The quarry provides a large target for the bow and arrow and for modern weapons it is not a sitting but a sleeping duck.

Not having learnt to protect itself, the rhino is doomed to extinction. Even in sanctuaries created solely for its protection in Assam

and Bengal, it leads a precarious existence. The other day five rhino horns were caught by the Calcutta Customs booked from Assam as cycle parts for onward transmission.

Sprawling over 166 sq miles along the bank of the Brahmaputra, the Kaziranga Sanctuary is fast becoming a rhino farm for poachers. They killed 37 rhinos in 1967 alone ! This concentration of rhinos in a single area is like keeping all our eggs in one basket and asking for trouble. The total number of rhinos now left in its existing habitat (including Nepal) would scarcely add up to 750, a number far below the critical point of the survival of such an unwieldy animal so unwilling to regenerate itself and so intent on committing *harakari*. The hunter has little to fear from this dullard of a dodo. If the horn had been mounted on the tiger or the bear, it would have been a different story.

Road to Extinction

India has already lost a smaller model of the one-horned rhino (*R. sondaicus*) which is now on its last legs in Burma, Malaya, Java and Borneo. Likewise has vanished the only two-horned diminutive species of India now known as the Sumatran rhino (*Didermocerus sumatrensis*) which occurs in limited numbers all over Southeast Asia, except in Java. The number of these vanishing survivors will not exceed a few hundreds.*

Of the two-horned African species, the black rhino (*Diceros bicornis*)—that runaway tractor—is able to fend for itself in South Abyssinia, East Nigeria and around Lake Chad. The two-horned white giant (*Ceratotherium simum*), next in size only to the elephant, has been rehabilitated in the Garamba National Park in the north of the Congo, in Zululand, and in the Kruger National Park. Their numbers are still in thousands and not in hundreds like those of the Asian species.

India owes not only to itself, but to the world at large to save

from extinction its only surviving link with its ancient past in the shape of its one-horned rhino. It would be advisable to disperse this national asset in other suitable areas as an insurance against any mishap which might overtake this helpless animal in its existing haunts which are only too prone to natural calamities like earthquakes and floods. If the rhino can breed freely at the zoos at Whippsnade and Basle, it can be trusted to look after itself in other more hospitable regions in India and elsewhere.

Note:- The advice tendered by this legendary Forester and Wildlife Conservationist, Late M.D. Chaturvedi, was blissfully heeded by Uttar Pradesh government and reintroduced one horned Indian Rhino to Dudhwah National Park in 1984 . Five rhinos initially inducted into the Park have now multiplied to 15. This is one of the success stories in the field of Wildlife Conservation

— Editor

*The European woolly rhino, dating back to Upper Eocene became extinct long long ago. (*R. antiquitatis*)

ESTIMATING DEER DENSITY : APPROPRIATE METHODS FOR THE BIOGEOGRAPHICAL REGIONS OF INDIA

BY

CHRISTOPHER J. HAMAR

Introduction

Knowledge of deer density and population numbers is a prerequisite for any deer management initiative. Deer census over time to determine population dynamics is necessary to identify management objectives and thereby inputs. Deer numbers affect relationships beyond the intraspecific. Tiger density and territory size correlates with prey numbers (Smith *et al.*, 1987). Forest tree damage, fencing needs for newly planted areas and crop damage to village farms are all a consequence of deer density.

India's extensive forests outside protected areas hold the potential as territorial corridors for contiguous tiger populations to counter isolation and inbreeding (Hamar, 1999). At very low deer density predation on cattle would increase and at high deer density crop and forest tree damage would accelerate. Both situations would result in higher compensation costs thereby increasing the economic budget for conservation.

Deer by nature are secretive with a tendency to avoid humans. This makes deer very difficult to observe even at high densities, resulting in a lack of awareness of the size of density of deer populations in many areas.

In the northern states of the U.S.A. seasonal migration of deer assist population estimates by congregating in what are called "deer yards" in winter. These deer yards are coniferous lowlands that afford protection from the elements. Barasingha (*Cervus duvauceli*) populations in western Nepal can be counted in their entirety. The deer congregate in recently burned grassland areas to

the exclusion of other habitats. This behaviour and habitat choice has enabled a count of the entire population (Henshaw, 1994). However opportunities and circumstances for counting entire deer populations with confidence are extremely rare.

Generally a dispersed deer population is well concealed by topography and vegetation. Obtaining accurate information about deer numbers and densities remain a difficult and a challenging task.

Deer population estimates for some of the Tiger Reserves (Chundawat *et al.*, 1999 ; Schaller, 1967 ; Karanth, 1987) are extrapolations from discrete studies with narrow sample counts and observations. Without stratification to obtain density for particular habitats the population total number is of little use in management considerations regarding risk of damage to crop areas and young regenerating forest trees. Carrying capacity and the size of a predator population that can be sustained are two other factors that cannot be estimated. Differential ungulate densities for two forest blocks that were ecologically similar showed illegal hunting pressure the agent of decline (Karanth *et al.*, 1999).

Deer counts conducted annually or biannually to establish density in a stratified forest habitat gives conservation managers more information about a protected or forest area than just a total estimate.

Selection objectives and methods

Of the nine species of deer in India only two sambar (*Cervus unicolor*) and chital (*Axis axis*) are well distributed over many parts of the country except at higher elevations. Two others, swamp deer or barasingha (*Cervus duvauceli*) and hog deer (*Axis porcinus*) survive in isolated populations due to their specialised habitat requirements. Indian muntjac (*Muntiacus muntjac*) is common on elevations above 1500 metres in the Himalayas, Western Ghats and

Nilgiris but densities are low due to behavioural ecology. Nilgai (*Boselaphus tragocamelus*) although an antelope is abundant and has an extensive range in India.

Forest cover in India includes the Himalayas, the Deccan, Eastern and Western Ghats and the North East or Assam hills. This broad biogeographical distribution of forest necessitates a choice of criteria that classifies forest under headings of similarity. Visually direct count methods require good visibility. Here deciduous forests are advantaged over evergreen forests and thereby affect method choice.

The Deccan is the largest biogeographical zone covering some 43% of India's land area and contains the majority of forested lands. These dry deciduous forests are dominated in the north by sal (*Shorea robusta*) gradually giving way to teak (*Tectona grandis*) and finally acacia in the southern most areas.

Deciduous forests also cover the Himalayas but it is the foothills or Siwaliks that contain the deer under investigation. The Siwaliks along with the upper Deccan share sal as the dominant tree species. The Eastern and Western Ghats contain evergreen forests. The North-east contains pockets of deciduous sal but generally the forest cover is evergreen of mixed species.

The terrain covering the biogeographical regions cited is hilly and rugged, intersected by small river plains with steep valley sides.

A factor that enters all investigative research is economic constraints. Costs are divided into equipment requirements and labour, that is the number of people and the time period. Financial budgets for both government and non-government organizations are very low. Expenditure on equipment is limited and the level of competence required for data collection raises labour costs thereby reducing the number that can be employed from those available.

Setting clear objectives is essential for the selection of the most appropriate census method. The requirement for age and sex with density per habitat type accumulating in an estimated population total precludes methods that only establish an index, although an index could be a secondary objective.

The three species targeted are chital, sambar and nilgai on mainly hilly terrain in forests that are either deciduous or evergreen. Labour costs need to be low and equipment inexpensive.

Deciduous forests — Direct count methods:

Because of leaf fall sighting wild mammals in deciduous forests is greatly enhanced as crown and shrub cover which restricts visibility are removed. Direct counts have the advantage of giving age, sex and direction of movement. *Aerial counts* used extensively in east and southern Africa can cover large areas of deer range in a relatively short period of time using only 2-4 people. It is possible to view down into open woodland habitats, species, sex and age can be determined if deer can be seen sufficiently clearly. Accuracy would be influenced by the presence of other animals such as goats, sheep and cattle. The operation requires much planning. Aircraft are expensive to hire and the method is best suited to flat rolling terrain.

Drive Counts: This method is successful for larger deer species especially in small woodland blocks. Beaters move gently through the area to move animals out of cover to enable them to be counted by the observers that are positioned within and around the area to be counted. The count is completed in one day but requires good co-ordination and communication via pocket radios. Number of animals, sex, age class, time of observation and direction of travel are all recorded. Over 100 people are required as observers and beaters making co-ordination difficult in thick cover and uneven terrain.

Vantage point counts: In this method the whole area is stratified into habitats. Blocks of 40-100 hectare randomly selected from each habitat are viewed from a vantage point. Binoculars are used to detect any deer and direction of movement. A telescope is used to classify deer located into age and sex classes. Observation times are dawn and dusk, periods of peak deer activity. Only 1-2 observers are required but good visibility is necessary and the method is only suitable in hilly terrain.

Spotlight counts: Deer can be counted at night with the aid of spot lights, which pick out the eyes of any animals up to 300 metres away that are facing the observer. Sex and age cannot be determined unless the deer are within 50 metres range. The area to be counted is identified and visited at night with one person driving the vehicle on side lights, another operating the spotlight and a third recording all observations. This method is relatively quick with low labour requirement (3 people) and medium equipment costs as vehicles and spotlights are readily available.

Thermal imaging: This method requires thermal imaging equipment, availability is limited and prices of U.S.\$ 12,000 to U.S.\$ 70,000 a piece put it well beyond the budgets of most. However, the distance sampling method it employs is considered below.

Distance sampling: A transect route is determined and while moving along this line the perpendicular distance is calculated from any observed deer to the transect line. Medium equipment costs but low labour costs (1-2 people) if the line is walked.

Evergreen forests — Indirect count methods:

Track/Slot counts: This method has been tried in areas where soil type enables clear imprints to be formed. Regularly used pathways crossing the woodland boundary are counted or the number of slots formed in prepared ground over a specified period of time. Labour

and equipment costs are low.

Faecal pellet counts: Faecal pellet groups are one of the most obvious signs that deer are present in an area. Counting the number of faecal pellet groups can be used to provide an estimate of population density. A prerequisite is knowledge of the species defecation rate and pellet decay periods.

Clearance counts: Sample plots allocated in a stratified habitat are searched and cleared of all pellet groups. On the second visit which needs to be before the average decay time for a pellet group the plots are once again searched for pellet groups and counted. The number of deer per hectare equals the number of pellet groups per hectare divided by the result of the period of time (days) multiplied by the defecation rate (pellet groups per day). Labour (1-2 people) and equipment costs are low.

Standing crop strip transect counts: Effectively a long thin plot 500-2000 metre times 1 metre in size. The procedure involves recording pellet groups found within each 10 metre length of 1 metre wide transect. Once again transects are randomly located in deer range that has been stratified. Number of animals per hectare equals the number of pellet groups per hectare divided by the result of the defecation rate (pellet groups per day) multiplied by average decay times (days) for a pellet group. Low labour (1-2 people) and low equipment costs.

Discussion:

The estimated mean of a population needs to be as close as possible to the true mean. This accuracy is influenced by the closeness of repeated estimates to each other, and these are dependent on the level of bias which is a systematic component of error in method application. Methods that have a low component of bias or where bias is readily detectable would have an advantage

in achieving accuracy.

Direct counts: Aerial counts are subject to several sources of bias. The proportion of animals seen is influenced by flight speed and height. The proportion seen is also dependent on the observers experience whose performance is subject to tiredness and comfort in the aircraft.

In distance sampling density can only be estimated on the assumption that deer on the transect are not missed or that they do not move before being detected or are counted twice, that the distance is estimated without error and that all observations are independent events (that is a deer is not detected because it is flushed from cover by another). In practice many of these assumptions will not be met thereby raising the level of bias. Transects cannot always be located randomly and deer may avoid or be attracted to the transect when it is a road or path. However, this is detectable when the data is analysed.

Drive counts are influenced by observer bias in determining age and sex class. Given the large number of observers needed, this could have a major influence on the results. Deer are very difficult to flush from cover and remain hidden even when dogs are used further affecting accuracy.

As a vehicle is necessary in Spotlight counts it can only be used where there is a suitable system of roads or tracks and subject to bias as discussed above for road or path transects. Age and to a lesser degree sex is difficult to determine under spotlight conditions and deer may flee rapidly at the sound of a vehicle or glimpse of vehicle lights.

Precision in Vantage point counts can only be determined if a number of representative of each habitat are sampled. Bias may be introduced if the area observed is not typical of the habitat type being sampled.

Data collection period is the least for Drive counts as this is completed in one day, depending on the number of samples the others can take from one to seven days (Table-1). Although the higher figure for the latter methods could be reduced if more people were used the negative returns would be in increased labour and equipment costs.

The excellent performance for accuracy in estimating a population attributed to Aerial counts (Norton-Griffiths, 1978) is only possible if the pilot is experienced in the flying requirements of the method and the observers are skilled through previous experience. The low labour requirement is misleading as labour costs for the experienced personnel would be very high matching the very high equipment costs. The over riding disadvantage is that the method is unsuited for hilly terrain.

Vantage point counts can only be conducted in hilly terrain although the method is effective in undulating terrain if a high platform or machan is constructed to create a vantage point. This method holds the lowest component of bias with the lowest labour and equipment costs. Sandwiched between Aerial and Vantage counts are the other three methods (Table-1). Of these the least suitable would be Drive counts. Although fine for European forest blocks which do not contain large predators, the method raises safety issues especially for the observers in an Indian forest. A flushed tiger, leopard or bear would distract an observer concerned for his or her own safety and thereby affect his or her observations of the flushed deer, introducing another component of bias. With the large number of people needed the high degree of organization and disruption to forest fauna makes the method a poor choice and one to be avoided.

The accuracy in Spotlight counts is probably very poor as the component of bias cannot be reduced. Poor visibility is the major cause so observer experience cannot insure accurate observations.

Difficulty in determining age and sex class and inadequate habitat stratification by restriction to the available road and track system renders this method limited in use and, therefore, not recommended.

In Distance sampling the components of bias can be reduced with observer training although this increases costs in both time and labour. With good planning transects can be sited successfully in stratified habitat. When the assumptions for this method are not met the data often reflects this and corrections in analysis are possible (Kerbs, 1989).

This makes Distance sampling a second choice after Vantage point counts.

Indirect counts: Knowledge of species defecation rates and pellet decay periods are difficult to establish. Using information from published research of defecation rates and decay periods could prove spurious as significant variations occur between locations. For example in the Western Ghats decay rates on the eastern slopes would differ from western slopes because eastern slopes are subject to greater precipitation. Tree canopy cover or lack of it further affects decay rates as does thick grass cover in comparison to open ground. Defecation rates vary due to dietary differences and water availability. The method has been used successfully to establish density of forest elephants in Africa (Buss, 1990). Elephant boluses are conspicuous and although similar to hippopotamus the latter on land scatter their dung with a sideways wagging of the tail thereby alaying any ambiguity in identification. Pellet droppings between deer species are very similar and identification may prove contentious. Data collecting periods are four to twelve months, further adding to the administration difficulties of this approach. In regard to the species to be investigated in this paper the nilgai defecates in middens and so cannot be censused by faecal pellet count methods.

Track/Slots counts where the observer looks for footprints in areas of soft ground or on prepared ground by having raked clear to ensure that the same prints are not counted again is a useful way of detecting the presence of species. It is unreliable as an estimate as the assumption that deer enter and leave the forest block on consecutive days cannot be proved valid. Further bias may result as soft ground raked areas may be avoided or favoured. However, counting deer tracks for every 16 km of dirt road correlated reasonably with other estimates of density (Mooty & Karns 1984).

Counting deer pathways crossing a forest boundary per 100 metres would appear an appropriate method for the tidal creeks of the Sunderbans where high tide would remove previous tracks and deer tracks crossing at low tide from one forest area to another is then used as a measure of deer presence. This would perform better as an index than an estimate.

Given the large element of bias in the indirect methods cited and the inability to collect data on sex and age class, it is worth considering the application of direct count methods.

Karanth *et al.*, (1999) estimated density using Distance sampling in Nagarahole National Park. Data was gathered by six teams of two observers each who walked the six permanent transects over a 13 day period. The season in which the census was conducted is not stated as Nagarahole is mainly moist tropical deciduous forest with leaf fall occurring in the regions summer (Feb-May), an adaptation to cope with water stress. Distance sampling is not dependent on the ease of sighting the deer species being censured, as the analysis of data to calculate density estimates sighting probabilities or a detection function. The detection function is calculated from the distances measured between groups of deer and the transect line and defines the probability of deer being detected at a given distance from the transect. This makes it possible to estimate density from the number of deer encountered along the route sampled.

To be sufficiently accurate requires 50-70 separate sightings for each species. So in poor visibility it is the period for data collection that would be increased to ensure accuracy.

The calculations for the analysis of Distance sampling would be a daunting task were it is not available as a computer programme called Distance which is on the world wide web at-
<http://www.ruwpa.st-and.ac.uk/distance/>

Conclusions

With nearly all of India's deciduous forests growth on hilly terrain Vantage point counts under the objectives of this paper are most appropriate. Applied for maximum success when trees are leafless or have a greatly diminished canopy, January-March for sal forests and the greater part of the hot season for teak. An advantage of this census method is that it can be applied by enthusiastic individuals, foresters and naturalists who can accumulate empirical information about an area that is currently non-existent.

For evergreen forests or forests where Vantage point counts cannot be applied Distance sampling is recommended. Requiring more equipment, time and trained personnel its implementation would require large groups of individuals within or brought together by a non-government organization. A de facto administration could also adopt this approach.

Accurate stratification is necessary for both census method and an approach to this is discussed in Appendix 1, with details of the Vantage point count method in Appendix 2 and Distance sampling in Appendix 3.

Appendices

Appendix - 1.

Habitat stratification:

The horizontal like the vertical arrangement of vegetation does provide a distinctive pattern for zonation. There can be a marked difference between zones in relation to abundance of associated animal species. Habitat preference by deer does influence distribution and density, therefore, the study area needs to be divided into sub areas in relation to habitat difference.

Stratification allows separate estimates of the means and variances to be made for each stratum. This in turn gives greater precision to the overall estimated mean.

Normally stratification is based on habitat or ecological features. Correlating food availability with forests in India would fall under these categories and, therefore, local interpretations and adjustments will be necessary. It is important to keep the categories as low as possible i.e. 6 or less, as the number of sampling units within strata need to be large in relation to the number of strata to maintain the advantage of stratification.

Complications in stratifications may arise when habitat domination varies in relation to vegetation species. In sal or teak dominated forests this may not occur but in forests of mixed species other variables will have to be taken into account to achieve stratification.

Within each of the stratified classes it may be necessary to sub-divide again, as some areas may have high human access or other disturbances. Other areas may include rutting stands at specific times. As much knowledge as possible that can be gathered for an area will prove advantageous in stratification of the habitat.

Appendix - 2.**Vantage point counts:**

The area to be censused is first stratified into habitats. Samples

of habitat randomly selected from each of the representative habitats which can be viewed from a suitable vantage point are clearly marked on a map of the area. Areas within the sample that cannot be viewed are blocked out on the map. These would include dead ground in the lee of ridges and small blocks of different tree age structure. The area is then methodically scanned using binoculars (8-10x50 mm) for any deer movement. A telescope (15-60x50 mm) is used to classify any deer located into age and sex classes. Today with the availability of zoom binoculars, the single piece of equipment can fulfil both of the above requirements. The objective lens diameter should not be less than 50 mm due to the ambient light at watching times.

Samples which should be large 40-100 hectare can be viewed from a distance of up to 1 km. All deer observed, sex, age and their direction of movement are recorded on the map and record form (Fig. 1 & Fig. 2). Watches should last at least 2.5 hours (3 is best) to ensure that animals which had settled to ruminate just before the observer arrived are rising to feed again before the watch is completed.

Peak deer activity periods tend to be around dusk and dawn, particularly where human disturbance is high and so the most suitable periods for observing deer are 06.00-10.00 and 16.00-19.00 hours. At the end of the count period the minimum number of deer seen (taking account of observing the same animals more than once as they move in and out of cover) is related to the area being observed and expressed as a density per square kilometre.

Three to four counts should be carried out for the same area over consecutive mornings and evenings. Other areas representative of the same habitat structure should be sampled and habitat specific density calculated as the mean of the densities determined for each sample. This is repeated for each of the different habitat types in the total area. Total population size can then be estimated from habitat

specific densities.

Appendix - 3

Distance sampling:

Buckland *et al* (1993) should be consulted when using "Distance" as the information given here is an outline and is not fully inclusive of the method.

The area to be surveyed should be clearly identified on a map on which the transect lines are marked. If for practical reasons transects follow existing forest roads and paths it is important that the routes surveyed are representative of forest stratification.

Transect routes should be 300-2000 metre in length and the minimum ratio of transect length (in km) to forest area (in sq.km) should be at least 25%. There should be at least 10 transects for each stratum. Walking into the wind scanning from back to front gives more uniform coverage than from front to back. The perpendicular distance from the transect line to the observed deer should be estimated. Distances should be measured by marking the position of the deer and the observer on a 1:10,000 map as accurately as possible. Perpendicular distances can be measured from the map afterwards. Where the transect bends the shortest perpendicular distance should be taken (Fig. 3).

Position should be estimated before the deer move away, or if they have already moved, their position before they took flight should be estimated. If the group is scattered the position to an animal close to the group centre should be estimated. The deer are counted and classified by species, sex and age.

The computer programme "Distance" is used to analyse

data. Worldwide Web address in Discussion of main text.

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HIMALAYAN TRAIL

BY

I.S. NEGI, I.F.S. (RETD.)

HIMALAYAS have always attracted man. In the past hermits haunted Himalayas in pursuit of peace and meditation. In recent times mountaineers and nature lovers were lured by the challenging heights and ecstatic beauty of Himalayas. But until the beginning of twentieth century Himalayas were a wilderness region. There were no motor roads, nor were many bridle paths and the entire region was largely covered with thick forests. Even today there are precious patches of forests in the fast depleting forestscape of Himalayan region. The lower ranges, say upto 7000-8000 feet above sea level were sparsely populated in the shape of tiny hamlets, which often merged with the broader forestscape. The upper reaches and forested areas were traversed by shepherds on make-shift paths, criss crossing the region. However, mountaineers and trekkers, mostly Europeans gradually laid well defined routes through this region. One of such tracks was between Gwaldam and Rini-Tapoban which later became immensely popular among trekkers. It was infact trekkers' delight. This is one of the few trekking routes marked by the Survey of India in their maps. The entire route from Gwaldam to Tapoban (in Niti valley), though measures a little less than 100 kilometres, passes through different aspects, altitudes, gradients and vegetational zonations. It crosses two big rivers, namely, Pindar and Nandagini, both major tributaries of mighty Alaknanda. The route also crosses over three passes (saddles) viz; Wan (9250'), Ramni (8330') and Kwari (14224'). The entire area encompasses high mountains, gorgeous rivers, deep water falls, dense forests, meadows, glens and glades. The mountains though rugged and formidably steep are incredibly beautiful.

Though mountaineers and trekkers have been frequenting this area in the past but after the Independence and more so after the Chinese aggression of 1962, this hitherto serene land was fast opened

by motor roads for human traffic, with the result that the trekkers and others found it expedient to travel through these areas by motor. Consequently these trekking routes lost their significance and were subsequently abandoned. And no efforts were made to revive them. After the Independence, particularly in fifties, some adventure groups from Calcutta, Bombay and Gujarat did try to revive these trekking routes but they were discouraged by utter lack of infrastructural facilities, such as halting places, tea stalls, guides etc. beyond Gwaldam. The local people were not interested nor are they enterprising and Government in turn did absolutely nothing to improve these trekking routes. They remain saga of neglect and apathy.

I had the opportunity of trekking on this route as back as in 1951, when this part of the country was paradise for nature lovers. In 1951, I was assigned to carry out status survey of class I forests of Garhwal. The class I forests were those reserved forests which lay in remote areas and whose exploitation was not commercially viable. As a result of grievances made by local people in 1921-22 these forests were separated from the rest and put under the administrative charge of district authorities. The local people were allowed to exercise unrestricted rights of timber, minor forest produce, grazing etc. There was not even skeleton staff to look after these forests and their condition sharply deteriorated for want of supervision. In early fifties there was a sane thinking to bring back the class I forests to the fold of forest management, not necessarily for timber harvesting but more earnestly for soil and water conservation. Notwithstanding their deteriorating condition the class I forests were rich both in flora and fauna.

For me it was a godsend opportunity to fulfil my fond desire of trekking and nature study. Since our trekking cum survey was a long sojourn in this primitive area it was necessary to equip ourselves fully as regards provisions. There was no shop at Gwaldam and none beyond that, so we had to send for our provisions from Garur, a

small hamlet about twenty miles down in Katyur valley. Our trekking was to start northwards from Gwaldam.

Gwaldam is a picturesque place at 6000' above sea level. From here one can see a long range of Himalaya including some of the high peaks viz., Nandakot (22510'), Nandadevi (25645'), Trishul (23360'), Dunagiri (23184'), Kamet (25447'), *et al.* Gwaldam also commands a spectacular view of vast expanse of forests, which makes one believe that still the forests in this part of country are dark and deep and that all is not lost.

It was first week of June 1951. The days were hot and sultry. The first leg of our journey from Gwaldam to Debal was only 6-7 miles. So, we decided to start in the afternoon. It was a steep descent upto Nandkeshri. The bridle path passed through chir pine forest, which constituted magnificent crop of chir pine, an exquisite quality class I. Along road side there was a chir preservation plot, laid by U.P. Silviculturist for collection of statistical data. The preservation plot contained a cluster of mature chir trees of large size, which naturally caught attention of passers by. In the quinquennial measurements of 1951, one of the chir trees measured 214 feet high. That time it was the highest living tree in India, beating the record of a protected chir tree in Tons valley near Sandra, which recorded a height of 185 feet.

There was not much wildlife, since the track passed through chir forest and villages. Nevertheless, we saw a solitary male barking deer grazing in a small opening by the side of a *nullah*. Barking deer generally live alone, rarely in twos and never in groups. A monitor lizard also came across, which ran for its life as soon as it saw us, we crossed river Pindar at Nandkeshri and reached Debal well before sunset.

Debal was a small but prosperous village, situated at the confluence of river Pindar and Kail Ganga. In Garhwal it is customary to call every river, stream or a water bearing *nullah* as Ganga in



← View of snow clad peaks
of Himalayas from
Gwaldam.

View of Trishul and→
South-West flank of
Nandadevi from
Gwaldam.



← Natural habitat of Tahr,
Bharal and Musk deer
in Nandagini Valley.

MAP SHOWING TRE-KKING ROUTE FROM GWALDAM TO TAPOBAN IN GARHWAL HIMALAYAS



order to accord religious sanctity to these streams and water therein. Pindar river originates from Pindari glacier (11880'), south-east of Nanda Devi (25845') and after flowing 40 miles in Almora (now Bageshwar) district and 60 miles in Chamoli district, finally joins the mighty Alaknanda river at Karanprayag. Pindar river is famous for mahseer fish (*Barbus putilora*). In those golden days fish was sold by Dhunars, a fishing community, not by weight but by piece and a single fish weighing 3-4 kgs could be purchased for eight annas only.

Kailganga originates from Trishul (23360'). The upper catchment area of Kailganga is snow covered, whereas the lower catchment is densely forested. Kailganga valley grows a fair amount of kail pine (*Pinus excelsa*), besides chir, cypress (*Cupressus torulosa*), fir, spruce and oaks. Incidentally there was only one village, called Ghes-Balan, in the entire valley. There was not much human activity and environment was perfectly serene.

After passing a peaceful night at Debal, next day we started early in the morning to avoid heat. The real trekking started from Debal only. The track passed through dense forests containing chir pine and oak, either pure or mixed in patches. The gradient was gentle. The next halting place was Bagrigad approximately 10 kilometres away. Since going was good and the forests were all class II forests, falling outside the purview of my assignment, we decided to skip over Bagrigad and reached Wan the same day.

Wan was a small village, situated at the base of Himalayan range, at an elevation of 8500'. It was the last village on Indo-Tibetan border. The villagers of Wan were aboriginals and lived a peripheral existence. They reared cattle, sheep and goats for making their livelihood. They also practiced seasonal agriculture and grew millets and potato. In a way Wan and similar other villagers in those far flung areas were self sufficient and self reliant. Their needs were few. They spun their clothes from the wool of sheep and goats. They sold potato and in lieu of it bought gur (brown sugar) and salt from outside.

They preferred to stay at home rather than come out for earning their livelihood.

My arrival at the village was a news to the villagers, as very few government officials used to visit the village in those days. I was staying in the forest hut at Wan. In the evening nearly half a dozen villagers came to see me and sat around. In the beginning they were shy and reticent but when I inquired about their welfare and the life they were leading under such harsh conditions, they became chummy and talkative.

I was carrying a BSA DBBL gun. One of the young men, who saw the gun slung at one corner of the room gleefully told me that a tiger had become cattle lifter and was causing a menace in Baidni *bugial*, where their cattle grazed during summer months. The very mention of tiger in Baidni *bugial* (11000') left me in a surprise. I had seen tigers in teak forests of Chanda - Balarshah of Central Provinces and Terai and Bhabar regions of Uttar Pradesh, but was not inclined to believe that tiger could venture to reach out Baidni *bugial* after crossing so many formidable heights of Kumaun and Garhwal hills. I arguably said that it could be a leopard which they had mistaken for a tiger. How on earth a tiger came to such snowy heights, I maintained. The discussion persisted and other villagers also joined the chorus. An old man, who till then was maintaining a studied silence, suddenly shot up and said, " Saab, do you think we are fools? We take our sheep and goats to Haldwani - Chorgalia forests, every winter and have seen tiger many a times. We very well know the difference between tiger and panther ". With the ruling given by the old man, most likely *headman*, I ended the argument and told them in a reconciliatory tone that, whether or not I would be able to shoot the tiger, but I would certainly go to Baidni *bugial* along with them.

Going to Baidni *bugial* meant a departure from my scheduled programme. But I could not resist the temptation of seeing Baidni *bugial* which had great tourist attraction even in those days. Next

day we started early in the morning so as to reach Baidni *bugial* before sun rise. The visibility was poor and the village track was steep and rugged. The villagers accompanying me guessed to make this 6-7 miles climb in two hours. But the journey proved to be tough for us and we took nearly four hours and reached at the fringe of Baidni *bugial* not before 9 a.m. The villagers took me to the site where the tiger had made the kill. When we reached near the place, I wanted to dissuade the villagers from the idea of killing the tiger and frankly told them that it was extremely risky to shoot a tiger from the ground and that a *machan* was a must where from we could stalk the beast. They scoffed at my suggestion and said that two of them would sit close behind me with *lathis* they were carrying and smash the head of the tiger should it attack me. I was amused at their simplicity and emphatically told them that it would be suicidal to attempt this misadventure. They agreed and took me to the site of kill. It was a shallow nullah bearing shrubby growth of Rhododendron, Birch, Viburnum etc. The tiger had eaten part of the kill and left it. Thinking that tiger must be some where near, we ducked behind a raised mound from where we could see the kill and the surrounding place. Within five minutes the investigative eyes of one of the villagers spotted the tiger, which was lying underneath the bushes. The man pointed at the beast and it was decisively a full grown tiger. The whisper and slight commotion caused by us disturbed the tiger and it quietly slipped into the jungle. My doubt was removed, as seeing was believing.

I then turned my sole attention towards the panorama of Baidni *bugial*. It was an unique landscape extending over several square miles in mid Himalayas at an elevation of 11000'. Baidni *bugial* is an alpine pasture where large herds of cattle, buffaloes, ponies, sheep and goats graze during summer months. The velvety grass is soft and succulent and grows with amazing rapidity. Each day cattle mow the grass to ground level and next morning it grows 3-4 inches tall. A variety of alpine flowers that bloom from May to September dot the grassy slopes. The light yellowish grass blending with pink, blue

and yellow flowers present an attractive panorama which makes an unforgettable memory. The small streams flowing at intermittent distances and silvery waterfalls here and there add to the grandeur of nature bestowed in this part of country. Throughout the day we had been roaming about the expanses of Baidni bugial, appreciating the bounty of nature so generously showered on it and returned to our camp with lasting memory of that fairy land. Mr. Vernede, the last British Deputy Commissioner of Garhwal had visited Baidni bugial in 1944 and he was so much fascinated to see its beauty that he ordered construction of a hut in Baidni bugial. This small hut was still standing there to commemorate the visit of that ardent lover of nature.

Next day we started early and after negotiating the tough climb from village Wan reached Kanol saddle (10000') at about 11 a.m. From village Wan we passed through class I forest for whose assessment this whole exercise was contemplated. The forest consisted of dense growth of oak and other broad leaved species. There was no perceptible damage to the forest as human interference was almost negligible. Consequently there was plenty of wildlife. On our journey from Wan to Kanol saddle we came across many sambar (*Cervus unicolor*), locally called *jarau*, a pack of wild pigs and a few barking deer. Near the saddle we witnessed a flight of monal (*Lophophorus impeyanus*). The flock consisted of three to four light coloured females and an equal number of bright coloured males. The male of dafia monal is perhaps the most colourful and beautiful bird in India. The tiring journey from Wan to the saddle turned into a pleasure trip on account of the richness of flora and fauna we came across.

After the tough climb from Wan we made a well earned long halt at the saddle. On our trekking route village Kanol lay three miles onward from the saddle and was next halting place on our route. There was a camping site in between the saddle and village Kanol where forest officers and others used to pitch tents for night stay.

(Now there is a Forest Rest House here albiet in a delapidated condition.) We had no tents and *Choldaries* with us and had no option but to stay in the village. While we were discussing the proposal regarding night stay, the local forest guard suggested that we better went to Bhuna - Bistola *bugials* for night stay as there was no proper accommodation available in village Kanol. Though going to Bhuna-Bistola *bugial* meant a departure from the chartered route, yet it served the twin purpose of seeing an equally beautiful *bugial* of Bhuna-Bistola and solving the problem of night stay. We were told that there were few hutments constructed by forest department at Bhuna. We promptly accepted his proposal and turned towards Bhuna-Bistola. From the saddle there was a bridle path right upto Bhuna-Bistola. Barring the first few miles the bridle path ran straight almost on the ridge at an elevation of 10000-11000 feet. The path commands a magnificent view of snow clad peaks of Trishul (23360') and Nanda Ghungti. The road passed through alpine forests. There were few scattered fir trees, some shrubs of *Rhododendron* and birch in depressions and mostly grass and flowers. Walking on this road was a divine experience. People say that when you walk on a higher plane your thinking also becomes high and you feel elated. It is true to a great extent.

On our way to Bhuna we saw a large flocks of monal. When we approached nearer, the females ducked under the shrubs, while the males flew and perched on tall fir trees and started crowing as if cautioning others to run for safety. This foolhardiness of monal has resulted in its large scale destruction in the past. To-day Monal is an endangered bird and is included in Schedule I of the Wildlife (Protection) Act of 1972. One of the reasons why monals were so abundant at Bhuna was that they fed on the seed of kuth (*Saucerea lappa*) which was cultivated at Bhuna. Kuth resembles sunflower and bears similar seed as that of sunflower. Forest department raised a nursery for propagating kuth in 1935 at Bhuna. Though kuth successfully propagated here but did not find market and, therefore, not harvested. The rhizomes of kuth spread all over the area and ran wild.

Kuth seed has become a staple diet of monal in that area.

In the morning I decided to go further up to see wildlife. We had barely walked a couple of hundred yards when we saw a musk deer. This area used to be favourite haunt of musk deer. It is also found either singly or in pairs. It prefers to live near tree line that is, a zone where forest with high trees meets the shrubby and grassy land. During winter it descends down to 8000'. Musk deer has a peculiar habit. When it sees a man it runs away, but not very far. And if you sit there for a while the musk deer will come to the same place out of sheer curiosity to know as to what the object was. The shikaries take advantage of this and stalk the musk deer easily. Musk deer is also an endangered species and is included in Schedule I of the Wildlife (Protection) Act of 1972. On further going towards steep slopes, we saw a large herd of Bharal, the blue sheep (*Pseudopsis nayaur*). They were grazing or to say more precisely were basking in the morning sun on the easterly slope. To have a clearer view of the herd, we went closer to the bottom of the slope and watched them for full fifteen minutes. Though they had seen us, yet they remained unfazed. Only after they moved further up, we retreated and returned to our camp. We made one day's halt at Bhuna. Our stay at Bhuna was memorable one. The thatched huts were cosy and comfortable even at 11000 feet elevation. Fortunately the weather was good and sky was clear. The nights were very pretty. The whole area including snow peaks in the front profusely bathed in silver moon-light. At dusk and dawn the frontal peaks shone golden red.

Next day we straight away descended in Nandagini valley by-passing village Kanol. We were to cross river Nandagini at Churagad. There was no bridge anywhere over Nandagini except at Ghat. At Churagad the river flew through a narrow gorge, where current was fast. The snow on upper reaches of the river had started melting and water had become muddy. We dared not to wade through the river at this point and decided to walk a few extra miles down stream and reached Machhlibagar an old camping site. There were no huts or

roofed structures of any sort and we decided to pass the night in the open at Machhlibagar.

In the morning I went to the river bank to find out a possible place for crossing the river. To my surprise, I saw scores of people catching fish with nets and traps. They came for fishing well before dawn and by then had already collected quite a few mounds of fish. The river bed at this stretch was wide and water was shallow though muddied. They were catching fish with great festivity, truly in the proverbial manner of fishing in the troubled water. The man who was guarding the heap of fish, came to me and after knowing that we were forest people, he offered four to five kilos of fish to me, which I gratefully accepted and brought to our camp. We had sumptuous lunch of rice and fish that day. Fish of river Nandagini are very tasty. People say that colder the water tastier is the fish. In the afternoon we crossed the river at Machhlibagar itself and took upward journey for village Ramni. Though the climb from Machhlibagar to Ramni was steep and tough, but the weather in the afternoon became pleasant and made our journey comfortable.

Ramni was a small village, situated at an elevation of 8000 feet on southerly aspect. The forest guard sent the words to the headman before hand and the villagers welcomed us and made arrangements for our stay in village school. Ramni was a prominent village and was often visited by tourists and government officials. They knew how to deal with outsiders. The headman who led us to the school invited us to see Pandav dance they had arranged in the village that night.

The function started after dinner. The entire village gathered at the central place in the courtyard of headman. I was offered a seat at a raised platform, where I squatted. Village elders joined me. There was separate seating arrangement for men and women. A big camp fire was made in the middle of spacious courtyard. The function began with a *dholi* (drum man) appearing in the courtyard near the fire.

He was clad in a long white robe, tight trousers (*churidar payjama*) and was sporting a white turban as well. The *dholi* then started beating the drum and chanting *shabd* (*musical recitation*) in rhythmical manner. As the recitation of *shabd* and beating of drum became louder and louder, the atmosphere became tense and the audience charged with emotion. After a few minutes the *dholi* picked up a handful of rice from a bronze plate, which was placed there and showered it over an elderly woman. The lady started shivering and in a fit jumped into the courtyard and started dancing with the rhythms of the drum. The headman who was sitting close to me briefed me that Kunti, the mother of five Pandavas was born. She danced for a while with the rhythms of drum and *shabd* and then started showering rice one by one on five persons with a little pause in between the two. Like this Yudhishter, Arjun, Bhim, Nakul and Sahdev were picked up. They jumped into the fray one by one. They all started dancing along with Kunti. Then the new *avatar* of Kunti showered a handful of rice on a young lady and she became Dropadi. All the seven persons danced for another minute when five Pandavas and Dropadi went to a nearby house, while Kunti retired to the audience. In just five minutes the five Pandavas appeared in white uniform (a long robe and tight trousers and turbans) and each holding white handkerchief in his hand. Dropadi came in white *sari* and a white scarf as headgear.

Thereafter started the real play. The *dholi* was joined with another drummer (*nagara* player) and a trumpeter. The Pandavas performed a mock bathing ceremony, *puja* ceremony, *bhog* ceremony in rhythmical dance sequence, taking rest after each item. They also dance performed their departure in exile and mock agriculture and animal husbandry operations and finally the battle of Mahabharata, all in perfect rhythm with chanting of *Shabd* and playing of *dhol*, *nagara* and trumpet. The dancing performance was punctuated by comic etc. The whole show was breathtaking. Alas, there were no video cameras in those days and these rare pieces of art and culture could not be captured in the camera. And today when such facilities

are available, the art performers have gone and gone with them has gone the art itself.

Next day when we reached on the ridge above village Ramni, we were delighted to see the magnificent view of snow clad mountains on the north and east and of forests and river valley in the south. The ridge itself was clear of vegetation over a considerable length. It is a long and a flat piece of land and with a little effort can be made into an air strip for landing light aircrafts. We stayed for an hour on the ridge, basking in the sun and enjoying the beauty of nature so richly bestowed upon this part of the country.

In the afternoon we proceeded towards Gaja Kharak, our next halting place in Birhi valley. We passed through thick forest. In fact the whole valley of Birhi river was covered almost with virgin forest. One of the tree species which caught our attention most was Box Wood (*Buxus sempervirens*) which was growing gregariously in Birhi valley on both sides of the river. Box Wood is a middle sized tree and grows upto 12" in diameter. It has close grains and white texture and is primarily used for making scientific instruments and toys. There was preponderance of wildlife. We saw large herds of sambar (*Jarau*). *Jarau* is a shade different from common sambar (*Cervus unicolor*) found in plain forests. It has dark grey coat and is much bigger in size, perhaps due to climatic change and richness of habitat. The other wild animals were barking deer, wild boar and seraw. Among birds koklas (*Pucrasia macrolopha*), monal and wood partridge were common. Gaja Kharak was merely a camping ground. There were few dilapidated thatched sheds made by villagers for steadling their cattle temporarily in summer months. However, the place was on the river bank and made a pleasant stay. The valley at that place was broad with Birhi river running through flattish ground. Birhi in those days was famous for trout fish and the river offered quite a few fishing sites at this place. In spite of the poor living conditions, the place was quite pleasant. Dwelling in the midst of forest with rich supply of water and fish for pot was really a boon. The class I forests north of

Birhiganga were dense and had not been exploited so far. The rich fir and spruce forests possessed great potential for exploitation for timber. I had to examine the forests from this point of view. We, therefore, decided to stay there for two days.

But our man in-charge of *bandobust* informed me that our ration and other provisions had exhausted. We had made provisions for ten days whereas we finished it in just eight days. People say that at high altitudes one's appetite increases tremendously and one tends to eat more than normal. This shortage of rations etc. caused some worry to me. There was no market place nearby, nor was there any point in sending men for ration to Chamoli which was 40 kilometres and as it would have taken for them two days in going and coming back with rations, we had no option but to live off the land for two days.

While I was thinking as to how to solve the problem of food, the local forest guard suggested that he knew a place where villagers cache potato and see if we could lay hands on it. Next day the forest guard along with a porter proceeded towards the *Kharak* down stream where the possible cache of potato was expected. And I went upstream to see the forest and wildlife. The terrain upstream gradually became steep and rocky. We would have barely walked one mile when we saw a large herd of tahr on a precipitous slope on the right flank of river Birhi. They were grazing on grassy footholds of the rocks. The Himalayan tahr lives mostly on steep slopes to escape predation by panther or hunting by shikaries. They are sure footed animals and can walk or run on steep rock faces with remarkable ease. On cruising further upstream we came across three to four herds of tahr. At one place where the tahr herd was right in front of us, we sat down and watched the herd grazing on the sunny slope across the river. It was a pleasant sight and we enjoyed it thoroughly. Beyond this place the terrain became steep and difficult to negotiate. We, therefore, decided to return to our camp.

At the camp many surprises were waiting for us. The forest guard was back with a sackful of potato and a wooden vessel full of yoghurt, which he brought from a nearby *Kharak*. Another surprise was that three of our camp followers caught about 20 kg of fish from river Birhi by diverting the channel. Though diverting the channel for catching fish is illegal but local people were permitted to do so as a concession granted to them in the forest settlement. Due to the resourcefulness of the forest guard and his men we were able to procure sufficient food stuff for the remaining two days. For two days we ate only potato, fish and yoghurt. The boys made many preparations from potato, such as, roasted potato, boiled potato, chips, curry etc. It was a day of eating, resting, bathing and preparing ourselves for the final assault on our journey from Birhi valley to Kunwari pass and thence to Tapoban in Dhaul valley.

Next day we started early in the morning and decided to cross Kunwari pass before noon. In the afternoon heavy wind blows on these heights and weather often become inclement. The so called path from Birhi valley upto Kunwari pass was steep and the thin-aired atmosphere on this height made breathing hard. We walked slowly making frequent pauses and enjoying the beauty of nature. The tiresomeness of uphill journey was more than compensated by the pleasure offered by the beauty of snow clad peaks, glaciers, rivers, waterfalls and lush green forests. As we walked further up trees were replaced by shrubs, grass and flowers. In June dwarf Rhododendrons were in full bloom. One could see Rhododendron flowers of all shades from papery white to pink, yellow and blue. Bushes of spirea with cluster of white and yellow flowers made spectacular sights. Further up in the alpine zone blue primulas, red potentillas and blue lark spur were common sights. As we went up the terrain became steep and rugged. On our right towards east we saw several big and small herds of Bharal, the blue sheep (*Pseudois nayaur*) grazing in shallow depressions between steep slopes. One herd was very big and spread over a large slope and looked like herd of Chamba goats. To see bharals in such large quantity in their natural habitat

was a memorable experience.

We had left our camp at Gaja Kharak at 7 a.m. and reached Kunwari pass at 1 p.m.. The journey though tiring was rewarding. We saw the nature in its pristine beauty, which has now been ravaged by man to fulfil his greed. It will never be retrieved again. The paradise is lost for ever.

The journey from Kunwari pass to Tapoban was smooth and down hill. From Tapoban we walked 6 miles to Joshimath and were back to the so called civilization.

The trekking route from Gwaldam to Tapoban besides presenting a panoramic view of Himalayas also offers immense opportunity for studying nature and gathering information on a wide range of subjects, namely, geography, biogeography, geology, ecology, botany and zoology. By merely observing nature we can get all the education we need. For making this trekking route popular among trekkers and tourists it is of paramount importance that the infrastructural facilities enroute are developed. It is earnestly hoped that the Garhwal Mandal Vikas Nigam Ltd. will take care of this.

गेंडे का पुनर्वास

—लेखक रामेश बेदी*

दूधवा नए घर में बस गए

अगस्त 1979 में इंटरनेशनल यूनियन फॉर कंजर्वेशन ऑफ नेचर एण्ड नेचुरल रिसोर्सेज सर्वाइवल कमीशन के एशियाई गेंडा विशेषज्ञ ग्रुप (एशियन राइनो स्पेशलिस्ट ग्रुप) की बैंकाक में बैठक हुई थी। इस कमीशन को अब स्पोसीज सर्वाइवल कमोशन कहते हैं। इस बैठक में एशियाई गेंडे की तीन जातियों की स्थिति का जायजा लिया गया था और उनके दीर्घकालीन संरक्षण के उपायों पर विचार किया गया था। स्विट्जरलैंड की बासेल युनिवर्सिटी के प्रोफेसर आर० शेन्केल इस ग्रुप के अध्यक्ष थे।

भारतीय गेंडे के बारे में ग्रुप ने आवश्यक समझा था कि जहां उनकी आबादी अधिक घनी हो गई है उनके लिए नये उपयुक्त इलाके मालूम किये जाएं और उन्हें वहां स्थानांतरित किया जाए। इससे गेंडे और मनुष्य का आपसी संघर्ष भी कम होगा और उसके पनपने के आसार व्यापक बनेंगे।

विशेषज्ञों की राय थी कि गेंडे को बसाने के नये घरों की तलाश में इस बात का ध्यान रखा जाय कि जहां तक संभव हो उन्हें उन इलाकों में स्थानांतरित किया जाए जहां यह जाति पहले रहा करती थी। ग्रुप की राय में काजीरंगा में इनकी आबादी पहले ही बहुत घनी हो चुकी है इसलिए उसे राहत देने के लिए और स्थानांतरित करने के लिए शीघ्र कार्यवाही शुरू करना अत्यावश्यक है।

काजीरंगा नेशनल पार्क में फट्टड़ और क्षत-विक्षत गेंडे भी दिखाई देते हैं। इनकी यह दशा आपसी लड़ाइयों में हो जाती है। एक तो जोड़ा बनाने के मौसम में ताकतवर नर एक-दूसरे की जान लेने को उतारू हो जाते हैं और दूसरे, चरागाहों के आधिपत्य के लिए इनकी आपसी लड़ाइयां ठनती हैं। जाहिर है कि काजीरंगा के जंगलों में इनके लिए जगह कम पड़ रही है।

*बेदी शोध संस्थान, डी 28 राजौरी गार्डन, नई दिल्ली-27

इस बात को ध्यान में रखते हुए भारत सरकार ने गेंडे का दूसरा घर उत्तर प्रदेश के लखीमपुर-खीरी जिले में दुधवा नेशनल पार्क में बनाने का फैसला किया। अधिकारियों की मान्यता थी कि असम में तो सींग के लोभी शिकारी गेंडों के पीछे हाथ धोकर पड़े हैं, दुधवा में शिकारियों पर नियंत्रण रखने की अधिक संभावनाएं हैं।

1981 और 1982 में भो, मैं दुधवा पार्क में गेंडे के नये प्रस्तावित घरों को देखने गया। स्रोतों और जलधाराओं से आप्लावित बड़े-बड़े पोखरों वाले पार्क की पंकिल भूमियों को मैंने देखा जहां असम के गेंडों को बसाने की तैयारियां पार्क के अधिकारियों ने कर ली थीं।

राजनीति के दलदली चक्रव्यू में

दुर्भाग्यवश वन्य जीवों के संरक्षण की इस बड़ी योजना को भी राजनीति के दलदली चक्रव्यूह में फंसना पड़ गया। असम के लोग कहने लगे कि हम असम के बाहर गेंडे नहीं जाने देंगे। गेंडे बाहर चले गये और दुधवा में बस गये तो हमारा एकाधिकार खत्म हो जाएगा। गेंडों को अपने प्राकृतिक निवास में देखने के लिए पर्यटक असम की बजाय दुधवा जाने लगेंगे। असम का महत्व खत्म हो जाएगा। असम सरकार भी नहीं चाहती थी कि दुधवा के लिए असम से गेंडे ले जाए जायं। असम के चीफ कंजर्वेटर ऑफ फॉरेस्ट्स (वाइल्ड लाईफ) ने कहा था, 'हम गेंडों के स्थानांतरण से प्रसन्न नहीं हैं। वे दुधवा में गेंडे बसाना चाहते हैं पर जिस इलाके में वे रहा करते थे वह सब गन्ने की खेती में समा गया है। उनके निवास के लिए यदि पॉकेटें हो बनानी हैं तो यहां कम-से-कम 20 जगहें हैं जहां स्थानांतरण किया जा सकता है।' असम के दूसरे वन-अधिकारी दुधवा में गेंडों के पनपने के बारे में केवल छह प्रतिशत सफलता का अनुमान करते थे। छात्र संगठन भी गेंडे ले जाए जाने का विरोध कर रहे थे। गड़बड़ी की आशंका देखते हुए गेंडों को हवाई मार्ग द्वारा ले जाने की योजना बनी।

रूस से भाड़े पर लिया गया एयरोप्लीट आई एल-76 कार्गो विमान जब गुवाहाटी उतरा तब छात्रों का एक डेलीगेशन गेंडे के घेरे के पास पहुँच गया और उसने अपनी असहमति जताई। उस वक्त गड़बड़ होन की आशंका थी। लेकिन

समझाने पर छात्रों ने बड़ी परिपक्वता दिखाई। उनकी मुख्य आपात्ति थी कि यह असम राज्य की सम्पत्ति है। उन्हें बताया गया कि राज्य सरकार को हर गेंडे की कीमत तीन लाख रुपये दी गई है और बिक्री-कर इसके अलावा दिया है।

राजनीति से प्रेरित इस विचार के साथ एक और आवाज असम में उठाई जाने लगी। विरोधी लोग दावा करने लगे कि दुधवा में गेंडों को पनपने के लिए अनुकूल पर्यावरण नहीं है। वे घासपात और वनस्पतियां वहां नहीं हैं जिन्हें असम में गेंडे खाते हैं।

प्रकृति प्रेमी के नाते मैं जानता हूँ कि उत्तर प्रदेश के तराई इलाके की आनूप भूमियों में 1870 के दशक तक गेंडे पाये जाते थे और यहां आखिरी गेंडा 1878 में पीलीभीत जिले के जंगलों में शूट किया गया था। यह स्थान दुधवा नेशनल पार्क से अधिक दूर नहीं था।

बिजली की बाड़ से सुरक्षा

पांच साल तक खटाई में पड़े रहने के बाद गेंडा पुनर्वास योजना को सफल बनाने के लिए असम सरकार ने सहयोग देना स्वीकार कर लिया।

इस योजना के अंतर्गत छह गेंडे गुवाहाटी से लगभग 60 किलोमीटर दूर असम के नौगाँव फॉरेस्ट डिवीजन में पोबितारा अभयवन में पकड़े गये। इनमें से एक फिर जंगल में भाग गया। शेष पांच में से दो नर और तीन मादा थीं।

इन महत्वपूर्ण प्राणियों ने 30 मार्च, 1984 को गुवाहाटी से दिल्ली तक की ऐतिहासिक यात्रा रूस के कार्गो विमान से संपन्न की। दिल्ली हवाई अड्डे पर पहुँचने पर इन्हें विधिवत रूप से उत्तर प्रदेश के वन मंत्री को सौंप दिया गया। दिल्ली से दुधवा नेशनल पार्क तक 500 किलोमीटर की यात्रा इन्होंने 18 घंटों में ट्रकों पर पूरा की। 1 अप्रैल, 1984 को तड़के पांच गेंडों से लदे घूलि-घूसरित पांच ट्रक दुधवा पहुँच गये। पांच गेंडों में तीन मादा थीं। दुधवा पर्यटक परिसर से आठ किलोमीटर दूर ककगाहा के गास-मैदान में जब उन्हें उतारा गया तब वे लंबे सफर में थके हुए तो नजर आते थे, पर थे स्वस्थ। इन्हें करोब दो सप्ताह तक विशेष

रूप से बनाये घेरों में रखा गया और फिर पार्क में छोड़ दिया गया था। इनके पांच हेक्टेयर निवास को बिजली की तार वाली बाड़ से घेर दिया गया था। इसमें 60 हजार वोल्ट बिजली को करंट बहती है। ज्यों ही कोई गेंडा बाहर निकलने की कोशिश करेगा उसे बिजली का झटका लगेगा, दुबारा वह निकलने की कोशिश नहीं करेगा। बाहर के पशुओं को भी यह बाड़ अंदर जाने से रोकती हैं। इससे गेंडे हिंसक जानवरों के हमलों से भी सुरक्षित हैं। बाड़ को विद्युतधारा से जानवरों के जीवन को कोई खतरा नहीं है।

दस लाख रुपये में पांच गेंडे

जुलाई 1984 में छपे समाचारों में बताया गया था कि नये घर में एक मादा गेंडा तो मर गई थी। यह गर्भवती थी और आशा नाम की एक मादा गेंडे की अगली टांग का मई में ऑपरेशन करना पड़ा था। इज्जतनगर की इंडियन वेटेनरी रिसर्च इंस्टिट्यूट के डॉक्टरों ने उसके बारे में कहा था कि विशाल प्राणी हमेशा के लिए अपाहिज हो गया है। इलाज से वह ठीक नहीं हो सकता। ऑपरेशन उसके लिए पूर्ण रूप से मुसीबत बन गया। बहुत समय से वह सुस्त पड़ा रहता है। उसकी दयनीय हालत को देखकर रिसर्च इंस्टिट्यूट के डॉक्टरों ने उसे जीवन-मुक्त करने की जोरदार सिफारिश की थी।

उत्तर प्रदेश सरकार ने पांच गेंडों की कीमत करीब 20 लाख रुपये असम सरकार को दिये थे। दो गेंडों की हानि से उसे बहुत आर्थिक क्षति उठानी पड़ी। गेंडे का नया घर बनाने की योजना को कार्यान्वित करने वाले महत्वाकांक्षी अफसरों को जबर्दस्त झटका लगा।

इन्हीं दिनों गेंडा पुनर्वास योजना को एक संवाददाता द्वारा की गई गलत रिपोर्टिंग का सामना करना पड़ा। प्रकाशित समाचारों में कहा गया था कि गेंडा पुनर्वास योजना के लिए पकड़ा गया एक गेंडा तुरंत मर गया। आलोचकों का कहना था कि यह मौत योजना के लिए अपशकुन की सूचक है। श्रीगणेश ही अनिष्टकर हो गया है।

तथ्यों की जानकारी देने के लिए सरकार ने एक प्रेस नोट जारी किया। इसके अनुसार जो गेंडा मरा था वह करीब 15 दिन पहले पकड़ा गया था। पुनर्वास योजना के लिए पकड़े गये छह गेंडों से इसका कोई ताल्लुक नहीं था। भारत-बांग्लादेश सीमा पर बसे गांवों में यह माल और जान का नुकसान कर रहा था। उन्हें इसके उत्पा से बचाने की जिम्मेदारी असम के वन्य जीवों को संरक्षण प्रदान करने वाले अधिकारियों की थी। उनकी प्रार्थना पर उसे पकड़कर असम सरकार के गुवाहाटी चिड़ियाघर को सौंप दिया था। करीब दो सप्ताह से यह वहीं रह रहा था और वहीं मर गया था।

नेपाल से चार मादा गेंडे आये

आरंभिक असफलता के इस माहौल में निष्ठावान अफसरों की हिम्मत पस्त नहीं हुई। चारों ओर बिजली की बाड़ लगे पांच हेक्टेयर घेरे में बचे तीन गेंडों का वंश बढ़ाने के लिए असम से और गेंडे मंगाने की कोशिश की जाने लगी।

तीन गेंडों में एक मादा थी। दो नर थे—बांके और राजू। पहली अप्रैल, 1985 को नेपाल के चितवन नेशनल पार्क से ट्रकों द्वारा चार मादा गेंडे दुधवा में स्थानांतरित कर देने से पुनर्वास योजना में नई जान आ गई। चितवन की मादाओं में एक हीरामणि थी। पहली चितवन में उसने राजू को अपने दिल का राजा बना लिया। दुधवा के फॉरेस्ट गार्डों ने जुलाई के शुरू में इन्हें प्यार-मुहब्बत करते और जोड़ा बनाते देखा था।

बांके अपने नाम के अनुरूप बांका और तगड़ा गेंडा था। वह अपने एकमात्र प्रतिद्वंद्वी राजू की मौजूदगी को बर्दाश्त नहीं कर पाता था। मादाओं पर स्वामित्व के लिए दोनों में निरंतर लड़ाई रहती थी। बांके ने राजू को कई बार पटकी दी थी और उसे दूर खदेड़ दिया था। जून 1988 में भंयकर लड़ाई ठनी और यह निर्णायक रही। राजू बुरी तरह जखमी हो गया था। जान बचाने के लिए भागकर पड़ोस की झाड़ियों में उसने शरण ली। गेंडे के इस छोटे-से परिवार से अलग कर उसे विशेष रूप से बनाये चार वर्ग किलोमीटर घेरे में रख दिया। इसके चारों ओर बिजली की बाड़ लगी थी।

पांच रानियों के हरम पर बांके का निदर्वन्द स्वामित्व स्थापित हो गया। ज्यादा खून बहने और खून में सड़ांध पैदा करने वाले जीवाणुओं के संक्रमण से दिसम्बर 1988 में बहादुर प्रतिद्वंदी राजू की मौत हो गई। 27.5 वर्ग किलोमीटर के इलाके में स्वच्छंदता से विचरती हुई पांच रानियों के शाह के पास घास का मैदान, झाड़खंड, जंगल, दलदली भूमि और एक झील यानि वह सब कुछ था, जिसकी गेंडों को जरूरत होती है। बिजली की बाड़ के बावजूद भी इस छोटे से परिवार का पार्क के अन्य शाकाहारी और मांसाहारी जानवरों के बीच निरंतर मेल रहता था।

वंशवृद्धि

नये घर में गेंडे बस गए थे और सुखी थे। इनकी वंशवृद्धि की संभावना का पहला प्रमाण 1987 में देखा गया। दुर्भाग्यवश बच्चा मर गया। उसकी मौत के वास्तविक कारण का निश्चय नहीं किया जा सका क्योंकि लाश देर से मिली थी।

इस परिवार की एक मादा हेमरानी ने 2 फरवरी, 1989 में एक बच्चे को जन्म दिया। भारत में गेंडों को स्थानांतरित करने की योजना की यह पहली वास्तविक सफलता थी। इससे बहुत से देशों में वन्य प्राणियों के सुविज्ञो को उन वन्य जीवों के भविष्य के प्रति आशावान् बना दिया जो अपने पुराने निवासों में लुप्त हो गये थे।

दुधवा में बच्चे के जन्म के बाद अतिरिक्त सावधानी बरती गई जिससे कोई अवांछनीय बात न हो जाय। हिंस्र जानवरों से नये बच्चे और मां को बचाने के लिए बड़े घेरे के अंदर दो वर्ग किलोमीटर का एक छोटा घेरा बनाया गया। मां को अतिरिक्त चारा भी दिया जाने लगा।

बच्चा स्वस्थ और चुस्त था और अधिकतर खेलने के मूड में रहता था। वह पोधों को सूँघता फिरता था, मुँह में छोटी टहनियां उठा लेता था और बिना बात दौड़ पड़ता था।

मई 1989 में दुधवा के गेंडा परिवार में एक दूसरी मादा ने एक बच्चे को जन्म दिया। जून में नारायणी नामक गेंडी ने एक बच्चा दिया। 1989 में चार मादाओं से चार बच्चे पैदा हुए।

एक नर बच्चा पैदा होने के डेढ़ महोने बाद, न्यूमोनिया से जनवरी 1990 में मर गया। 1991 के अगस्त-सितम्बर महोनों में दो बच्चे पैदा हुए। बच्चों की कुल संख्या पांच हो गई।

नेपाल से स्थानांतरित की गई एक वयस्क मादा गर्भपात और भीतरी संक्रमण से 25 सितम्बर, 1991 को मर गई। यद्यपि जंगल में ऐसी मौत सामान्य घटना है परंतु स्थानांतरित किये गये गेंडों के छोटे-से कुनबे में यह गंभीर क्षति थी। कुनबे में कुछ नये सदस्यों के आने और कुछ सदस्यों के विदा होने के बाद दस सदस्य हैं जिनमें चार वयस्क मादाएं, एक नर और पांच बच्चे हैं (हिन्दुस्तान टाइम्स, 17.12.92)। इनकी सेहत संतोषप्रद है। नवीनतम गणना के अनुसार वयस्क तथा बच्चों को मिलाकर पार्क में गेंडों की कुल संख्या 15 हो गई है। यह एक उत्साहवर्धक खबर है।

प्रकृति प्रेमियों को इससे संतोष है कि गेंडों को स्थानांतरित करने की योजना की सफलता में संदेह नहीं रहा। फिर भी, सुविज्ञ महसूस करते हैं कि नये घर में कुल 10-15 गेंडों का होना पर्याप्त नहीं है। मूल योजना में दुधवा में 30 गेंडे बसाने का लक्ष्य था। जितना जल्दी संभव हो, इस लक्ष्य को प्राप्त किया जाना चाहिए। इस दिशा में प्रयास जारी है। किन्तु बहुत कुछ तो प्रकृति पर निर्भर करता है।

गेंडे के सम्बन्ध में कुछ रोचक तथ्य

द्वारा—इन्द्र सिंह नेगी, भा० व० से० (अ० प्र०)

पिछली सदी के उत्तरार्द्ध तक नेपाल की सीमा से लगे उत्तर प्रदेश की तराई में एक सींग वाले गेंडे बहुतायत से पाये जाते थे। किन्तु कालान्तर में इस क्षेत्र में जंगलों तथा घास के मैदानों का सफाया करके धान की खेती की जाने लगी। गेंडों का प्राकृतवास नष्ट हो जाने के कारण, वे उक्त क्षेत्र से लुप्त हो गये। अब गेंडे केवल असम के काजीरंगा नेशनल पार्क में ही रह गये हैं।

गेंडों की प्रजाति को लुप्त होने से बचाने के लिये विगत 15 वर्षों में असम तथा नेपाल से लाकर दुधवा नेशनल पार्क में गेंडों का पुनर्वास किया गया है। यह सुखद आश्चर्य है कि दुधवा नेशनल पार्क में लाये गये 5 गेंडे बढ़कर अब 15 तक हो गये हैं। गेंडे शाकाहारी प्राणी हैं। और मैदान में घास तथा झाड़ियों की पत्तियाँ आदि खाते हैं। जंगल के बीच में घास के मैदान जहाँ प्रचुर मात्रा में पानी उपलब्ध हो, गेंडों के लिये उपयुक्त “हैबीतात” है और काजीरंगा के बाद दुधवा ही ऐसा क्षेत्र है जिसमें गेंडों का पुनर्वास हो सकता था। किन्तु दुधवा में गेंडों के पुनर्वास की प्रारम्भिक सफलता से आश्वस्त होने की आवश्यकता नहीं है वरन् इस क्षेत्र में गेंडों के पुनर्वास को स्थायी एवं दीर्घकालीन बनाने के लिये निरन्तर प्रयास जरूरी हैं।

गेंडों के पुनर्जनन की प्रक्रिया धीमी तथा जटिल है। नर तथा मादा को सहवास के लिये एक साथ कामोन्मुख होना जरूरी है। साधारणतया जब मादा ‘हीट’ में आती है तो नर कामोन्मुख नहीं होता और वह मादा से मिलने में किंचित मात्र भी रुचि नहीं दिखलाता है। इसी प्रकार जब नर कामोन्मुख होता है तो मादा नहीं होती और वह नर को पास नहीं फटकने देती है। ऐसे अवसर बिरले ही आते हैं जब नर और मादा दोनों ही एक साथ कामोन्मुख होते हैं। इस समस्या से निपटने के लिये आवश्यक है कि एक ही क्षेत्र में कई नर हों ताकि जब कोई मादा हीट में आये तो एक न एक नर कामोन्मुख हो और सहवास के लिये उपलब्ध हो सके, किन्तु इसमें भी कठिनाई है। जब कोई मादा हीट में आती है तो श्रेष्ठ नर अन्य वयस्क नर गेंडों को खदेड़ देता है और कामोन्मुख होते हुये भी वयस्क नर हीट में आई मादा से सहवास नहीं कर पाता। यहाँ पर पार्क मैनेजरों की भूमिका अहम हो जाती है। उन्हें ऐसी अनुकूल परिस्थितियाँ पैदा करनी चाहिये कि सहवास के लिये एक से अधिक नर गेंडों की उपलब्धता का लाभ उठाया जा सके। इससे गेंडों के पुनर्जनन में तीव्रता आयेगी जो इस प्रजाति को लुप्त होने से बचाने के लिये प्रथम प्राथमिकता है।

FROM OUR READERS

NOTE ON RELIGIOUS SENTIMENT OF PEOPLE FOR NILGAI (*BOSELAPHUS TRAGOCAMELUS*) NEAR JODHPUR, RAJASTHAN

BY

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Religious sentiment by the local people which is hidden after nilgai's name 'gai' (cow) they do not kill it. During one of my observational trips I was fortunate to see the religious sentiments of local people attached to this animal while coming back from my study site 'Bhirkali' via Manaklao village (22 kms North to Jodhpur) on 17 September, 1999, I saw an injured nilgai female lying on the road which might have been hit by some vehicle as her neck was broken and legs wounded. Being severely injured she was unable to stand up and move away from the road (see plate 1). After my stoppage there, many more people also stopped and congregated at the spot. Two of them brought a rope, tied the injured nilgai and pulled her 40 m apart from the road. After the animal was kept, a person who was with his family members and was going home in a taxi, saw and stopped too. They were having water bottles and with the help of water bottles the injured nilgai was provided water. After this event animal felt relaxed and stopped throwing legs. One person came with an antiseptic cream which he brought from his nearby dhani (house). He applied the whole cream on the wound on legs of nilgai. Another person who was going to his village from Jodhpur carrying vegetables for selling, stopped, and after seeing an injured animal, spread lot of green coriander bundle and other vegetables for its feeding. The whole exercise which the people did, was exactly same which they would otherwise have done to the human being met with an accident. The love for this animal is still in the heart of people. Even though it is considered a major crop raider of western Rajasthan (see plate 2). It is perplexing to watch a similar accident if it would have been of dog may not be taken so serious by people.

They treat the blue bull as a "gai" which attaches a religious sentiments of people.

Due to religious sentiments, farmers are more tolerant to agricultural losses by this species as well as by black buck or chinkara considering that every creature of God have a share in natural resources and also feed the peafowl, pigeon, parakeet as a ritual seen in rural areas (especially by animal loving communities) during my survey.

A CASE OF STRANGE MORTALITY IN FISHES IN PONDS AROUND MIRZAPUR DAM, DISTRICT ROPAR, PUNJAB.

During a survey recently undertaken by a party of the Zoological Survey of India, Dehra Dun led by Dr. Vinod Khanna, under the project Studies on the Biodiversity of Shiwalik Ecosystem of Punjab, it was observed that in a couple of ponds receiving their water supply from Mirzapur dam, District Ropar, a large no. of fishes were seen floating dead on the surface and their complete skeletons strewn around the bank of the pond at **Avihpur** and **Gowchar villages** under the Block Siswa Road.

These community ponds, which get their water supply from the Mirzapur Dam, are used by villagers for irrigation purpose. The pond has abundance of fishes belonging to 4-5 species, some of which are exotic locally introduced by the Fishery Department of Punjab for their propagation. The most interesting part of the observation was the sight of a number of fishes floating dead on the surface of water in the pond, as also dried dead fishes and their skeletons strewn around the pond in large numbers. These dead fishes were not even being consumed by birds etc. On thorough probe and discussions with the villagers the partly could infer that :-

(i) the entire village belongs to **Radha Swami sect** and since they do not consume fish, the over crowding of the fish population in the pond, as a result, may have either led to the lack of subsistence needs and there is much of competition for food

or (ii) the turbidity level of water is too high

or (iii) while the dissolved oxygen level is too less the mineral level in water is too high

and (iv) lastly, the presence of large no. of leeches in the pond

and (iv) lastly, the presence of large no. of leeches in the pond may be disturbing the fish population existing in the pond.

Whatever may have been the reason for large scale mortality, strange phenomenon. A similar phenomenon was also observed at the pond in Gowcher, which is also fed by the Mirzapur Dam. The total expanse of the pond is nearly two acres. The ponds are also used by the villagers for bathing their cattles.

Through this note the authors intend is to attract the attention of the authorities for management of the fishes and maintenance of the ponds.

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FEEDING BEHAVIOUR OF GAUR. (*BOS GAURUS*)

The Gaur chiefly feeds on grass, browses on leaves and eats the bark of a variety of trees.

During recent visit in May 2000, to the Bar-nawapara Wildlife sanctuary of Raipur distt, Madhya Pradesh, in Sarkari-kua area, where fifteen to twenty year old *Tectona grandis*, plantation exists, it was observed that the bark of this species of trees was found peeled off, from about a meter above ground level, to two & half meter height. The closer observation revealed that, teeth were used, in peeling off the bark, as the enclosed photographs suggest.

Later at about dusk, two gaurs were witnessed, gnawing the bark of one of the trees, since the visibility was poor and the animals were partly hidden, they could not be photographed. It was earlier assumed, that the gaurs might have peeled off the bark by horns, but it was not the case, and in fact the peeled out patches proved to be the result of gnawing.

B-101, Gayatri - nagar,
P.O. Shankar nagar,
RAIPUR. M.P. 492007.
Dt: 12.06.2000.

— A.M.K.Bharos

Ref, The Book of Indian animals. S.H.Prater Ed 1971 p-243.
Wild animals in Central India. A.A.Dunbar Brander,
Ed 1982 P-149.

KNOW YOUR WILDLIFE

MUSK DEER

Musk deer (*Moschus moschiferus*), commonly known as Kasturi mrig, inhabits high altitudes usually above 2500 metres in the Himalayas from Kashmir to Arunachal Pradesh. It is a forest dwelling animal. It is shy and avoids company of other animals. It is either solitary or lives in pairs. Musk deer does not migrate and lives in one valley or locality.

Characteristics:

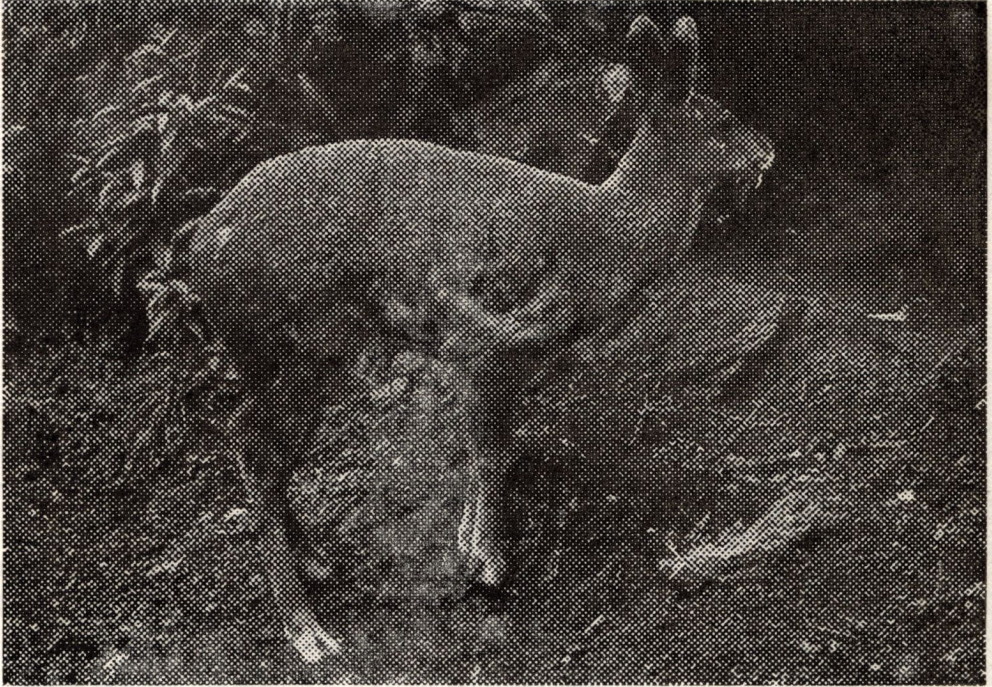
Musk deer is dark grey in colour. It is short and heavy. Its hind legs are larger than the front ones. It has coarse, thick and extremely brittle hairs which protect it against cold. Both sex do not have horns and they do not have face glands, which are generally present in other deers. It has gall bladder which no other deer has. It has long canine teeth loosely attached to the upper jaw. The buck has a gland in the skin at abdomen which secretes, particularly during mating season, the well known powerful scent due to which it is called musk or kasturi deer. The pod which contains kasturi is 1 to 2 inches in size and the contents of the pod weigh about an ounce.

Size:

A well grown musk deer attains a height of 20" at the shoulder and a length of 3'. An average musk deer weighs roughly 10 kilograms. Ironically the females are bigger in size and weigh more than males.

Habit:

Musk deer eat leaves of small shrubs, herbs, tubers and lichens from tree branches. For this purpose they climb the trees and watching a musk deer climbing trees is a pleasant sight.



Musk deer (*Moschus moschiferus*)
Photo : Courtesy Garhwal Mandal Vikas Nigam Ltd.



Serow (*Capricornis sumatraensis*)

Photo : Pratap Singh

Reproduction:

Pairing takes place in early March. The gestation period is about six months. The fawns are delivered in July - August. Generally one to two fawns are born at a time. Females are attracted by the strong scent of the musk exuded from the gland of the male.

Musk deer is the most sought after animal for its pod i.e., kasturi, which is an important item of commerce. Owing to Kasturi musk deer is in imminent danger of extermination. It is included in Schedule I of the Wildlife (Protection) Act of 1972.

SEROW

Serow (*Capricornis sumatraensis*) is a peculiar goat with large head, donky like ears, thick neck and short limbs. From appearance it is an unimpressive creature. Serow is generally shy by nature. But when disturbed or alarmed it runs with terrific speed and recklessness and will hurl itself down the most precipitous ground. Although clumsy in built it is exceedingly active, dashing away with great speed at the slightest alarm. When wounded its eyes shine with a peculiar gleam which makes the serow look almost foolish. Its power of hearing is very acute.

Habitat:

Serow is found throughout Himalayas between 5500' to 10000' from Kashmir to Mishmi Hills in Arunachal Pradesh. It generally inhabits thick forest and occasionally comes in open spaces on the ridges and spurs, which often define the edge of a forest. It also shelters in rocky caves and other such spots.

Size:

A fully grown male serow stands upto 42" at shoulder and

weighs upto 90 kg. Both male and female bear horns. The record horn is about 10" in Kashmir and about 13" elsewhere.

Reproduction:

The breeding season is in autumn and the young ones are dropped in early summer. Generally one to two fawns are delivered at a time.

A peculiar characteristic of serow is presence of face glands. The foolhardy nature of serow led to its indiscriminate shooting for meat and skin. To-day serow is facing extinction and is included in Schedule I of the Wildlife (Protection) Act of 1972.

— I.S. NEGI

Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interesrs of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts, Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of india in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects for the study of threatened species and related objects and to provide reference and reserch facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Socitiefy of India will entitle you to?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
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- (7) You will be supplied "Cheetal", the quartely journal of the society free.

3. For membership particulars write to Honorary Secretary, Wildlife Preservation Society of India, 7 Astley Hall, Dehra Dun.

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